

West Nile Virus Response and Mosquito-Borne Virus Surveillance Plan Summary

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**Utah Department of Health
Utah Mosquito Abatement Association
Utah Department of Agriculture and Food
Utah Veterinary Diagnostic Laboratory
Utah Division of Wildlife Resources
Utah Local Health Departments**

Introduction

Utah has had a statewide mosquito-borne disease surveillance program since 1948. The recognition from 2000 to 2004 of the progressive spread westward and substantial human and animal health impact of WNV prompted the expansion of this plan to include a WNV Response Plan. This document provides a summary of the updated and enhanced surveillance plan as well as a summary of the response plan that identifies key agencies and delineates their roles to protect people and animals from WNV and other mosquito-borne diseases.

Communication and Coordination

Prevention, detection, and response to WNV will require a coordinated approach by several different governmental and non-governmental organizations/agencies. It is necessary for governmental agencies and other partners to work together to effectively respond to a community or statewide threat. The following chart provides identification of key partners and a brief description of their primary roles and responsibilities:

Organization/Agency	Principal roles & responsibilities
State Agencies	
Utah Department of Health (UDOH) Office of Epidemiology Utah Public Health Laboratory (UPHL) Public Information Office	Human health <ul style="list-style-type: none">• Developing and coordinating a statewide system to detect WNV and a statewide effort to prevent WNV human disease• Consultation with and support of local health department efforts to detect and prevent WNV• Communication and coordination with CDC• Coordinating media contact regarding human disease and WNV activity when the information has statewide implications.• Communication with state level policymakers regarding human health aspects of WNV, in cooperation with UDAF and UDWR.
Utah Department of Agriculture & Food (UDAF) State Veterinarian Public Information Officer Veterinary Disease Laboratory (One-time Mosquito Control Funds)	Domestic animal health <ul style="list-style-type: none">• Conducting surveillance for WNV disease in horses and domestic animals• Administering distribution of supplemental resources for mosquito control• Communication with veterinarians, livestock owners, and the general public regarding animal health implications of WNV• Communication with state level policymakers regarding domestic animal health aspects of WNV, in cooperation with UDOH and UDWR.
Utah Division of Natural Resources, Division of Wildlife Resources (UDWR)	Wild animal health <ul style="list-style-type: none">• Conducting surveillance for WNV in wild birds.• Communication with state level policymakers

	regarding wild bird health aspects of WNV, in cooperation with UDOH and UDAF.
Utah Department of Emergency Services and Homeland Security (DESHS)	Emergency and disaster response <ul style="list-style-type: none"> • Coordinating the local, regional, or statewide emergency response, in conjunction with UDOH, if required under epidemic conditions. • Serving as a liaison with the Federal Emergency Management Agency (FEMA) in the event that a federal disaster has been declared.
Other State-level Organizations	
Utah Mosquito Abatement Association (UMAA)	Mosquito control <ul style="list-style-type: none"> • Coordinating the purchase and distribution of sentinel chickens. • Receiving, tracking, and dispersing payment for surveillance expenses. • Coordinating surveillance and response activities among member districts.
Local Agencies	
Local Health Departments (LHDs) (12)	Human health <ul style="list-style-type: none"> • Conducting epidemiological investigations of cases of human disease in conjunction with UDOH. • Notifying jurisdictional health care providers if evidence of viral activity is present. • Participating in active WNV surveillance programs • Conducting WNV prevention activities within jurisdiction, in coordination with UDOH and local MAD officials
Mosquito Abatement Districts (and other local agencies conducting abatement) (MADs)	Mosquito control <ul style="list-style-type: none"> • Monitoring abundance of larvae and adult mosquitoes. • Collecting and submitting mosquito pools for viral testing. • Maintaining sentinel chicken flocks, obtaining blood samples, and submitting to UVDL. • Conducting control of larvae and adult mosquitoes • In cooperation with LHD, educating the public on mosquito avoidance.
Other	
Hospitals, clinics, other medical providers	Human health care
Veterinarians	Animal health care
Utah State University (USU) Extension Service	Toxicology information
Utah Poison Control Center	Toxicology information
National Agencies	
Centers for Disease Control and Prevention (CDC), Division of Vector-borne Diseases	Human health – national, consultation
Environmental Protection Agency (EPA)	Pesticide information

Communication activities between these partners will differ according to level of WNV activity detected in Utah. Active mosquito season will involve regularly scheduled conference calls with an additional conference call in response to first WNV detection. After first detection has occurred, regularly scheduled conference calls will continue with special conference calls occurring for developments in WNV activity such as detection in previously unaffected host (i.e. horse to human), new detection of WNV in previously unaffected LHD, or human WNV deaths. Regularly scheduled conference calls will occur 2-3 times per week under outbreak circumstances in which multiple human and/or equine cases have been confirmed.

Ongoing and regular communications that keep each partner organization/agency informed of events detected by and activities conducted or planned by other partners is a critical part of this plan. Specific notification protocols have also been developed in response to specific events (i.e. first human case, planned press releases, etc.). In terms of intra-agency notification, only one contact person is identified for each partner agency/organization. That person will be responsible for notifying others within that agency/organization.

Surveillance

Surveillance includes the monitoring of immature and adult mosquito populations, and the detection of virus activity through testing (1) mosquitoes, (2) sentinel chickens, (3) wild birds, (4) horses, and (5) humans for infection. Surveillance activities must be able to rapidly detect WNV, WEE, or SLE activity in Utah, and may facilitate the detection of newly introduced viruses. Results will be reported via ArboNet to the Centers for Disease Control and Prevention (CDC) in accordance with National Notifiable Disease Surveillance System and CDC guidelines.

Mosquito Surveillance

Local MADs place traps in urban and rural areas with known mosquito activity. The number and types of traps placed is based on available personnel and equipment. Trapping may begin in early spring in warmer regions of the state and continue through fall months.

Monitoring the abundance of adult mosquito populations provides important information on the effectiveness of larval control efforts and the size of the vector population. The mosquito testing is designed to detect WNV, WEE and SLE. Local MADs collect mosquitoes and separate the pools of mosquitoes by species for shipment to the UPHL. UPHL testing will focus on *Culex* species. These species are indicated as the most likely vectors for WNV in Utah.

Sentinel Chicken Surveillance

Sentinel chicken flocks are placed throughout the state (~380 birds in flocks of 5-10 chickens each) by the local MADs. Chicken flocks are located in areas with known mosquito activity and placed under the care of an individual flock master who has agreed to provide for the basic care and feeding of the flock. Flocks of yearling chickens are placed in May. Pre-season sera are collected from the chickens before they are deployed.

From May to September, mosquito abatement personnel bleed the chickens on a weekly basis. Sera from each flock are pooled and tested at UVDL for the presence of antibodies against WNV, WEE, and SLE. If antibodies are detected in a pool, the individual samples in the pool are tested separately.

Wild Bird Surveillance

The Utah Division of Wildlife Resources (UDWR) in cooperation with the Utah Department of Health (UDOH) conducts surveillance of wild bird populations for West Nile virus and other related arboviral infections/ Avian surveillance usually begins in May and continues into October. Target species for testing include birds of the Corvid family (ravens, crows, jays, etc.), Raptors, and other discretionary species which may be exhibiting neurologic symptoms.

Conservation Officers and Wildlife Technicians employed by the UDWR are primarily responsible for collecting specimens for testing. Specimens are collected from dead or dying birds reported by the public. Avian samples are collected via an oral swab. These samples are then shipped to UPHL for testing via real-time polymerase chain reaction (rtPCR). Samples are tested for WNV, SLE, and WEE; results are reported via ArboNet in accordance with CDC guidelines. All disease reporting is initiated by the UDOH in accordance with established guidelines.

Expansion of the Utah avian surveillance program during the 2004 season successfully incorporated existing bird banding stations into WNV surveillance efforts. The UDWR's bird banding stations are maintained annually throughout the state to collect data on Utah's live wild bird populations.

Equine Surveillance

Equine encephalomyelitis (Eastern, Western and Venezuelan) and WNV infections in equines are reportable to the UDAF. Reports are submitted by veterinarians or laboratories, and are investigated by UDAF as indicated. Contrary to the experience of eastern states, equine infection is often the first indicator of WNV activity in the West. This finding is attributed to the extensive overlap of equine and mosquito habitat in Utah's arid environment.

Human Surveillance

Encephalitis, meningitis, and WNV infection are reportable diseases listed under Utah's Communicable Disease Rule (Utah Administrative Code R386-702). Reports are received from health care providers, laboratories, or other parties and are investigated by the LHD as indicated. Utah is tracking all syndromic presentations of WNV infection and reports probable and confirmed cases to the CDC.

If evidence of an active outbreak of WNV-related human illness develops, then UDOH will implement active surveillance measures to ensure proper detection of human neuroinvasive cases. First, reports of encephalitis or meningitis from laboratories where no etiology has been specified will be followed by a phone call to both the laboratory and responsible health care provider to determine if the etiologic agent had been identified, and if the patient's history

warranted offering additional testing. Second, during the months of July through October, a small active surveillance system will be set up with several referral center-level hospitals.

Viremic donor surveillance occurs in coordination with the major blood collection agencies servicing Utah. UDOH receives direct notification of WNV detection in blood donations from collection agencies with appropriate information required for case investigations. Viremic donors identified as having appropriate WNV symptoms are included in case counts. If no WNV symptoms are identified, viremic donors are separately classified from human WNV cases for Utah.

Laboratory Testing

Positive test results from UPHL and UVDL will be repeated and then reported to the appropriate agencies so that appropriate Public Health and Veterinary interventions and mosquito control may be initiated.

Mosquito Testing

The UPHL performs real-time polymerase chain reaction (RT-PCR) testing on mosquito pools submitted by the MADs. MADs trap mosquitoes on a weekly basis and deliver or mail to the UPHL. All mosquito pools are tested for WNV, WEE and SLE.

Wild Bird Testing

UPHL performs RT-PCR for WNV on oral cavity swabs of dead birds. WNV can be present in the oral cavity of birds at high levels. Corvids and raptors are the preferred species for testing.

Sentinel Chicken Testing

UVDL performs IgM ELISA testing of sentinel chicken sera for WNV, SLE, and WEE. All seroconversions detected in pooled sera are separated and re-tested as individual bird serum samples. Additional sentinel chicken bleeds may be requested in the area of positive animals.

Equine Testing

UVDL performs serologic testing for WNV on equine serum and CSF. Veterinarians send serum on equines that display neurological symptoms to UVDL to test for antibodies to WNV.

Human Testing

UPHL performs testing of serum or CSF specimens from patients with signs or symptoms compatible with neurological disease. A validated IgM enzyme linked immunosorbent assay (ELISA) is used to test for the presence of antibodies to WNV and SLE. Requests for testing should be reviewed and approved by a public health epidemiologist familiar with WNV-related disease at the UDOH or a LHD. Patients that do not meet the above criterion are referred for testing at a commercial lab. Selected patients who are suspected of having WNV infection, but do not meet the above criteria (i.e., West Nile Fever, or other complications) will be considered

for testing at UPHL when such testing would provide the first evidence of human WNV activity in an area. Select specimens found positive at UPHL may be referred to CDC for additional testing.

Commercial laboratories are requested to submit any samples for Utah residents that have tested positive for WNV to the UPHL for confirmation at the beginning of human case detection. Confirmatory testing of positive samples from commercial laboratories are evaluated during the season based on agreement of test results and discontinued when confidence is determined. Testing using RT-PCR will be considered for selected immunocompromised patients with symptoms of WNV neuroinvasive disease. PCR is not recommended for patients able to mount an immune response. Viral load in humans is usually low.

Mosquito Control

Currently there are mosquito control agencies in at least 19 of the 29 counties in Utah. The level of control ranges from mosquito abatement districts (independent government agencies sole with the sole purpose of mosquito control) to one or two personnel from a public works department who perform mosquito control as is needed. The level of control and professionalism varies greatly among these agencies. However, most of the highly populated areas in the state, particularly from Brigham City southward to Utah County have mosquito control agencies operating at a very professional level. Other highly populated areas throughout the state also have good mosquito control, including the Uintah Basin area, Moab, and St. George.

Agencies in the state that may be doing mosquito control are highly encouraged to use a program consisting of Integrated Mosquito Management (IMM). IMM consists of a number of practices and, when used in a comprehensive program, maximizes the elimination of vector species while impacting the environment as little as possible. The essential components of an IMM program include:

1. Surveillance
2. Education
3. Water control
4. Biological larval control
5. Chemical larval control
6. Adult chemical control

Each MAD is faced with unique challenges in controlling mosquitoes and protecting the public health of the citizens in their district. Some districts have small populations of people with large mosquito populations while others have large populations of people and few mosquitoes. There are at least 50 different species of mosquitoes in Utah. Each species has a unique biology, i.e. feeding habits of larvae and adults, seasonality, number of broods per year, where the eggs are laid, etc. Therefore, no two MAD programs are the same; each is tailored to the needs of the type, number, and location of mosquitoes in relation to people and the financial resources available.

Mosquito control using IMM is not triggered by the presence of a disease. Control is done on an ongoing basis in anticipation of disease. Mosquito control must be started long before surveillance has detected the presence of a disease. IMM for the control of mosquitoes begins well before the public sees adult mosquitoes. The presence of a mosquito-borne disease in an area may elicit a more intense approach to mosquito control for areas with existing mosquito control programs.

The UPHL and UVDL perform testing of surveillance samples to determine the location of arbovirus activity. This information allows the Mosquito Abatement Districts (MAD) to initiate control measures for the mosquito vector and for epidemiology to target areas for increased public education.

Education, Prevention, and Dissemination

The UDOH, in collaboration with LHDs and other partners, will prepare and disseminate prevention and information messages to the general public, medical community, and public health community.

Website

The WNV website can be found at www.health.utah.gov/wnv. Currently, the website will be updated on Wednesdays by 1:00 p.m. Elements of the website are: Disease Status, Prevention, Information for the General Public (this includes press releases), Information for Clinicians and Public Health, Meeting Information, and Links

Fact sheets and Consumables

The following fact sheets and consumables have been developed:

1. Fight the Bite poster
2. Mosquitoes around the house tear off sheet
3. Clinician posters
4. English/Spanish handout cards
5. Display boards
6. PowerPoint slide sets for the general public and clinicians
7. General information fact sheets

Community Outreach

The UDOH will coordinate and facilitate community outreach including: Working with retailers, businesses, and community organizations such as churches, clubs, etc to disseminate information on WNV.

Media

In 2004, the UDOH Office of Public Information and Marketing (OPIM) coordinated with the UDOH Office of Epidemiology and contracted the Utah Advertising Federation (UAF) to prepare, produce and place public service announcements (PSAs). These announcements urge the use of repellent containing DEET. A variety of applications for the creative message include:

- 2 English TV :30 spots, 1 Spanish TV :30 spot
- 2 English :60 radio spot, 1 Spanish :60 radio spot
- A variety of :5 and :10 teasers/billboard/bookends for radio and TV.

Due to inadequate budget, radio spots will air in June and TV spots will air dependent on additional budget.

The extent of radio and TV PSA placement provided by UDOH in 2005 will be determined and budgeted in April 2005. Partner agencies are urged to consider internal funding sources for WNV education/prevention directives. Partner agencies requesting radio and TV placements may visit www.health.utah.gov/wnv to download media spots, or may request other media formats from UDOH.

Listserv messages

UDOH will continue disseminating up-to-date information via the WNV listserv.

Public Information

The UDOH Office of Public Information and Marketing (OPIM) and EPI will begin the 2005 WNV season by distributing a “West Nile Virus 2004 Recap” report and maintaining a proactive media process. The intent of this report is to emphasis WNV activity in Utah for 2004, and to promote preventive methods for the 2005 season.

April 26th is the tentative date to release the season kickoff message. This will be managed by UDOH and coordinated with partners through their PIOs. The kickoff message will provide information on who speaks on certain issues and will provide a detailed introduction to the 2005 WNV season.

Messaging Schedule			
Date	Agency Lead	Message	Contact
April 23	UDOH	SLC Marathon. UDOH provided stuffers for marathoner's bags at the event.	Jana Kettering
April 26	UDOH	"Season Opener" news release. 2004 West Nile activity summary, personal protection, and 2005 message included.	Jana Kettering Cody Craynor
May 15	UDOH	TV and Radio Spots May Begin (based upon available funding).	Jana Kettering Cody Craynor
May 15	UDWR	Dead Bird Surveillance Actively Begins. The public should watch for and report dead birds: DWR provides the process.	Mark Hadley Leslie McFarlane
May 23	UDOH	First Chicken Bleed for All Sentinel Flocks (for active WNV antibody testing). Mosquito trapping now widespread.	Jana Kettering Cody Craynor
May 27	UDOH	Memorial Day Weekend PR Reminder to Use DEET and Protect Yourself.	Jana Kettering Local Health Department PIOs
July 1-4 th	UDOH	4th of July Weekend PR Reminder to Use DEET and Protect Yourself	Jana Kettering Local Health Department PIOs
September 2 – 5th.	UDOH	Labor Day Weekend PR Reminder to Use DEET and Protect Yourself.	Jana Kettering Cody Craynor
September 10 – October 2	UDOH/UAF	Radio/TV Ad Rotation May Finish (based upon available funding).	Jana Kettering Cody Craynor
Planned events and messages should be communicated to partners as soon as the plan is set to avoid duplication of released messages on the same day. This plan indicates the dates the UDOH OPIM was informed of by April 20, 2005.			

Useful Media Tools and Tips for WNV Reporting

Use the following contacts for information about these target groups:

Bird testing and collection, contact the Division of Wildlife Resources (DWR)

Horse case counts and vaccination, call the Dept. of Agriculture and Food (UDAF)

Mosquito trapping and spraying, sentinel chickens, call your mosquito abatement district (MAD)

Human cases, personal protection methods, contact the Utah Department of Health (UDOH), your local health department (LHD) or the www.health.utah.gov/wnv website.*

Birds, Chickens, Mosquitoes and Horses

When WNV is first detected in 2005 (in a bird, mosquito, chicken or human), the LHD closest to the detection will release the information/news conference to the news media in partnership with other local, district and state agencies. For information about these cases/tests, contact your LHD public information officer (PIO) with questions.

When a case of WNV is identified in a horse, the UDAF will release the information in partnership with local agencies. UDAF may coordinate a news conference in partnership with local agencies on an as-needed basis.

Humans

Human tests can take several days to complete and will be provided in the following format:

- 1-4 cases: County/District of residence and age by category: (8 and under, 18-44, 45-64, 65 plus.)
- 5 or more cases in a specific area: County, gender and more specific ages may be used.
- Cases will be classified as probable or confirmed
- Once cases are confirmed they will be categorized as WNV Fever or WNV Neuroinvasive disease (meningitis/encephalitis)

As soon as WNV has been detected in any target group, results of testing will be available on the Utah Department of Health (UDOH) website at www.health.utah.gov/wnv. The testing results will be updated each Wednesday at 1 p.m. through October 2005. The UDOH may update the site more frequently if case counts change dramatically; if this occurs, a notice will be sent out to media by the UDOH PIO.

Media Coverage

When covering WNV please consistently offer messages about personal protection.

Partner agencies and LHDs are urged to link their websites to the UDOH website (www.health.utah.gov/wnv) as an additional resource. To obtain the digital Fight the Bite art to build a graphic link, contact the UDOH PIO.*

State Agency Media Inquiry Subject Areas and Contacts		
Issue/Focus	PIO Contact	Contact Information
Humans and issues relating to human case surveillance, testing results, protection, prevention, education and treatment, etc. Crossover on environmental/source reduction and testing results (UDOH Lab) with Mosquito Abatement.	Jana Kettering Public Information Officer Utah Department of Health or Local Health Department PIOs	Office: 801-538-6339 jkettering@utah.gov
Birds and issues surrounding asking the public to watch for and report dead birds, testing, results, etc.	Mark Hadley Public Information Officer Utah Department of Wildlife Resources	Office: 801-538-4737 markhadley@utah.gov
Issues concerning Mosquito types and life stages, trapping, techniques, environmental	Sammie Dickson, Manager Salt Lake City Mosquito Abatement District or Gary Hatch, Davis	SLC Office: 355-9221 sdickson@slc-mosquito.com

source reduction, sentinel chicken flocks, etc.	Mosquito Abatement District Or other local offices	Davis Office: 801-544-3736 hatchgary@qwest.net
Questions concerning pesticide use and its effect on humans.	Prof. Howard Deer, Extension Pesticide Spec. Utah State University	howardd@ext.usu.edu 435-797-1602
Questions concerning Horses , case numbers and locations, testing, vaccination and state mosquito abatement funding.	Larry Lewis Public Information Officer Utah Department of Agriculture and Food	Office: 801-538-7104 larrylewis@utah.gov
Issues that involve local health departments and their coverage area will be coordinated with their PIOs.	Local Health PIOs	Various/See additional contact list.

Response Levels

WNV will be classified in the following categories for the 2004 season:

No Risk (1) - Off-season, no detection

Low risk (2) – Active mosquito season, no detection

Possible (3) – Active mosquito season and detection in a bird, mosquito, or chicken

Probable (4) – High risk of human infection; or one horse or human case

Outbreak (5) – Multiple human or horse cases and conditions favoring continued transmission

No Risk to Low Risk (1-2)

- Routine public education
- Routine notifications to physicians and veterinarians
- Passive surveillance for avian mortality, human and equine meningitis/encephalitis
- Routine larval and adult mosquito surveillance and control activities
- Inventory pesticides and equipment
- Evaluate pesticide resistance in vector species
- Routine press notices (optional, based on needs of individual communities)

Possible or Probable Risk Response (3-4)

- Enhance public education (emphasis on source reduction, personal protection and use of repellents; may also include messages about the signs and symptoms of encephalitis with instructions to seek medical care if needed)
- Enhance information provided to physicians and veterinarians; conduct active surveillance activities
- Increase surveillance and control of larvae and adult mosquitoes
- Conduct localized chemical control of adult mosquitoes

- Ensure active notification of key agencies of viral activity – these agencies include, but may not be limited to, UDOH, LHDs, UDAF, UDNR, UMAA and all local MADs, DESHS, and the Governor’s office

Outbreak in Progress Response (5)

- Conduct a full-scale media campaign; emphasize mosquito bite prevention and include messages about the signs and symptoms of encephalitis with instructions to seek medical care if needed
- Alert physicians and veterinarians; continue active surveillance activities
- Continue enhanced surveillance and control of larvae
- Accelerate adult mosquito control
- Coordinate the response with DESHS; activate, or be ready to activate, an Emergency Operations Center if needed
- Determine if a local, regional, or statewide declaration of a ‘State of Emergency’ should be considered
- Ensure state funds and resources are available to assist local agencies
- Continue mosquito education and control programs until mosquito abundance is substantially reduced and no additional human or equine cases are detected